

# A Fast-Response Atmospheric Turbulence (FRAT) Probe with Gas-Sampling Ducts, Phase I

Completed Technology Project (2009 - 2009)



## Project Introduction

The objective of this proposal is to design, construct and test a high-frequency-response air-data probe, the Fast Response Atmospheric Turbulence probe (FRAT probe) that will be able to operate in harsh and humid atmospheric environments. Both requirements, high-frequency response and resistance to water spray can be accommodated by mounting the pressure sensors flush with the probe surface. We will also conduct research on how gas-ingesting ducts can be incorporated in the design without interference with the measuring capabilities of the probe, and we will provide for the incorporation of Anasphere's CO2 sensor. In the first phase of this effort, we will also explore the market for sensors to measure humidity and other physical quantities recommended by NASA and NOAA that can be incorporated in the base of the air-data probe. Accelerometers, magnetometers, GPS, a computer and other electronic equipment will be included to estimate the rigid-body motion of the platform carrying the probe, and then calculate velocity components with respect to an inertial frame. The final product will be the preliminary design of a stand-alone piece of instrumentation, available for mounting on a platform to measure atmospheric turbulence and the fluxes of different species and thermodynamic quantities.

## Anticipated Benefits

This instrument may appear useful in commercial micrometeorological applications that require the measurement of sensible heat, water vapor and trace gas fluxes, as they relate to air quality. This product will be readily available for mounting on any flying platform to measure atmospheric turbulence as part of environmental research or as it relates to aviation safety. Such measurements can improve our understanding of the high-wind boundary layer and the exchange of heat, moisture and momentum across the oceanic or terrestrial surface. Interest has been expressed by NOAA researchers to fly such probes into developing tropical storms. This equipment may also prove valuable in disclosing the fluxes of man-made or natural species, which are key elements of micrometeorology.



A Fast-Response Atmospheric Turbulence (FRAT) Probe with Gas-Sampling Ducts, Phase I

## Table of Contents

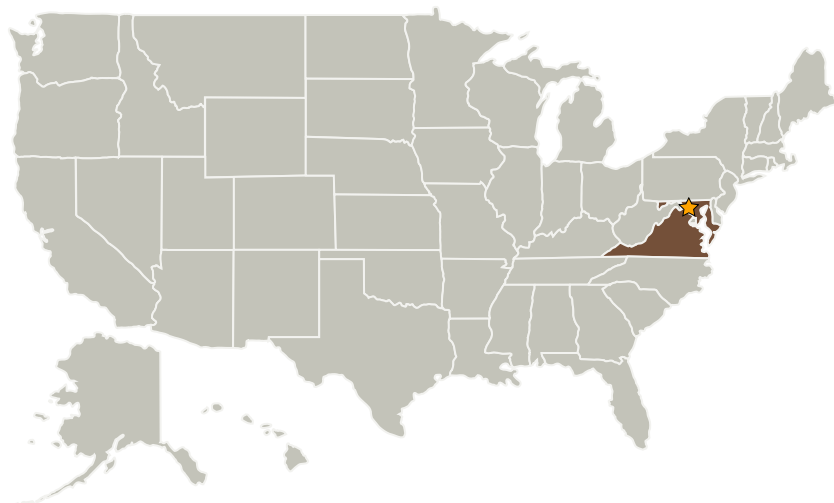
Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3

# A Fast-Response Atmospheric Turbulence (FRAT) Probe with Gas-Sampling Ducts, Phase I

Completed Technology Project (2009 - 2009)



## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Aeroprobe Corporation	Supporting Organization	Industry	Blacksburg, Virginia

Primary U.S. Work Locations	
Maryland	Virginia

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Project Manager:

Geoffrey L Bland

### Principal Investigator:

Demetri Telionis

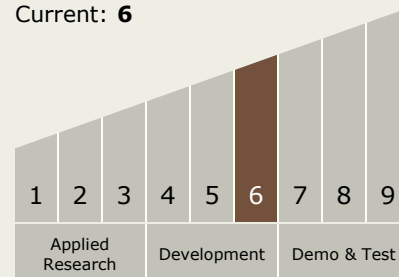
# A Fast-Response Atmospheric Turbulence (FRAT) Probe with Gas-Sampling Ducts, Phase I

Completed Technology Project (2009 - 2009)



## Technology Maturity (TRL)

Start: 6  
Current: 6



## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.5 Radiation
    - └ TX06.5.5 Monitoring Technology